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### Liberalizing the Dutch Electricity Market

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# TILEC Discussion Paper

# **LIBERALIZING THE DUTCH ELECTRICITY MARKET: 1998-2004**

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## **Abstract**

We describe the evolution of the structure of the Dutch electricity market since the E-Act 1998 that implemented the first EU Electricity Directive. The initial idea of the government was to combine liberalization in supply with concentration in generation, with the attempt to create a national champion that could compete on the European market. As the producers could not agree, the attempt failed and competition could develop. The production side now is less concentrated than in several other EU countries and the competition authority has played an active role in keeping it that way, among others by means of its intelligent analysis of the Nuon-Reliant merger, in which a VPP auction was proposed as a remedy. In contrast, regulation of the network business cannot be considered a success as bad drafting of the law prevented effective incentive regulation. Finally, the liberalization of the retail market for green energy, in effect since July 2001, has shown that retail competition may not yield many consumer benefits.

JEL codes: K23, L51, L94

Key words: Electricity, Market liberalization, Regulation

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## 1. INTRODUCTION

Since 1998, the Dutch electricity sector has been restructured in line with the two EU-Electricity Directives, with Dutch policy being somewhat ahead of the European average. In July 2004, the European Commission praised the Netherlands for being one of the two Member States, together with Slovakia, that met the July 1 deadline for implementing the second EU Energy Directives 2003/54/EC and 2003/55/EC. For the most recent state of affairs, we refer to the fourth benchmarking report that was published by the Commission in January 2005; see European Commission (2005). In this paper we describe the developments on the Dutch market since the E-Act 1998 came into effect.

As background, we describe in section 2 the state of the market in 1998. The relevant law at the time was the Energy Act 1989. That Act had aimed to establish two goals at the same time: competition in supply and efficient generation by means of coordinated production. The two goals soon proved internally inconsistent, hence, the law had to be changed again. The government memo "*Stroomlijnen*" that was published in 1996 anticipated the EU electricity market liberalization Directive 96/92/EC; it concluded that the existing Act was incompatible with it and outlined the essentials of the "*Electricity Law 1998*". This E-Act 1998, of which the first articles became operational on August 1, 1998, created the framework for the liberalization of the market. It established the Dutch electricity regulator, DTe, that oversees the market and that regulates network tariffs, as well as TenneT, the system operator and manager of the national transport grid. The law required legal unbundling of the networks and unbundling of the tariffs into network charges and electricity use. Finally, the law proposed gradual liberalization of the demand side of the market: the 650 largest users (representing some one-third of demand) were free to choose supplier as of 1998, the middle segment (again some one-third of demand) as of January 2002, while the entire market would be liberalized as of July 2004. We thus see that the requirements of the second Directive 2003/54/EC were essentially already implemented by this E-Act 1998. In section 3, we discuss the Act in more detail.

In the sections 4-7 of this paper we discuss the developments in the various market segments (production, transport, distribution and supply) since the 1998 law was passed. With respect to generation (section 4), the original idea underlying the E-Act 1998 was that the domestic producers would merge to create a national champion. As distribution companies owned some of the producers, there were conflicts of interests between the parties and the merger did not take place. As a consequence, the Dutch generation market is not as concentrated as that in many other European countries. At the same time, liquid wholesale markets have not developed and there has been a trend to vertical integration between generation and supply. Indeed, European Commission (2005) lists market structure, together with lack of market integration, as the major issue in the Netherlands. As we will see in section 5, there have, however, been major developments in the latter area. In transport (section 5), the main struggle was to get TenneT, the TSO, to be independent of the generating companies. While the original idea was that TenneT could be privatized, ultimately it ended up as a state owned firm. In distribution (section 6), privatization was a major issue as well. Distribution companies were owned by lower levels of government, which no longer saw a role for them in the setting guided by the E-Act 1998 and they wanted to sell their shares. While at first this was considered to be possible, later the sentiment changed, with the Minister being afraid that DTe would not be sufficiently powerful to force

privatized companies to act in the public interest. DTe also came into major conflicts with these distribution companies over the parameters to be used in the price-cap regulation scheme. The ultimate consequence of these conflicts has been that the Minister has proposed to (economically) unbundle the network companies from supply and generation and to enforce strict line of business restrictions. In supply (section 7), probably the most interesting experience has been with the liberalization of the residential retail market, where demand side subsidies were used to reach the Kyoto targets, which proved to be an expensive and ineffective system. In section 8, we draw some overall conclusions.

## **2. THE DUTCH MARKET IN 1998<sup>1</sup>**

The Energy Act of 1989 determined the market situation that prevailed in 1998, before the restructuring. While until 1989, the Dutch electricity sector had been characterized by vertically integrated local monopolies, the 1989 Act attempted to coordinate electricity generation to achieve efficiency gains. At the same time, the Act allowed for a limited amount of competition in supply and the two goals would prove to be conflicting. The 1989 Act explicitly distinguished between centralized (i.e. large scale) production and decentralized production. It aimed at central planning of capacity with the plan having to be approved by the minister and with SEP, the Association of Electricity Producing Companies, playing the role of a Central Electricity Board. SEP operated the large-scale facilities to ensure least-cost dispatch; it was the only party allowed to invest in the high voltage transport grid and also the only party allowed to import electricity. Together with SEP, the existing producers were instructed to ensure a reliable energy system at least cost. The Act stated that, to ensure coordination, generators had to offer their energy to SEP, with SEP acting as a clearinghouse between generation and distribution. In this respect, the law formalized the OVS, an agreement of cooperation that had existed since 1949, with the idea being that the existing large-scale companies would eventually merge. The minister had regulatory powers; he had to approve the uniform transport tariffs that SEP charged generators, the maximum energy tariffs that generators could charge distribution companies, and the maximum tariffs that the latter could charge consumers.

At that time, there were 23 distribution companies, owned by municipalities and provinces. Distribution companies were licensed and each had its own territory, in which it was obliged to supply electricity. Centralized production was in the hands of four large regional companies, EPZ, EPON, UNA and EZH, who jointly owned and cooperated in SEP. All shares of two of these producers, UNA and EZH, were in the hands of provinces and municipalities. The three regional distribution companies from the South of the Netherlands, DELTA, PNEM and MEGA, owned EPZ, while EPON was a 50% joint partnership of two distribution companies, NUON and EDON. The Act imposed a licensing system for new “traditional” generation exceeding 5MW and limited licenses to firms that already had 2500MW in operation, hence, entry for new generators was blocked.

The Act allowed for two types of competition. First, distribution companies and large consumers could buy electricity from generators other than the local one. Because of pooling of costs and regulation of prices, prices of generators were uniform; hence, this aspect did not lead to competitive pressure. More importantly, while the Act limited large-scale production to the existing generators, it also allowed self-generation by industry and CHP production by industrial firms or by joint ventures involving distribution companies. Such decentralized

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<sup>1</sup> For more detail, see also Brunekreeft (1997).

generation would eventually undermine the system. The Act forced distribution companies to take in all electricity that was locally generated and supplied to them, and to pay a feed-in tariff essentially equal to the avoided costs, which was essentially set at the system price at peak. Given these high and guaranteed feed-in tariffs, it was attractive to invest in decentralized capacity. As this happened, it decreased the demand for centrally generated electricity, raising the system peak price, hence, raising the feed-in tariff, thus making additional investments in decentralized generation attractive. As a result, decentralized capacity doubled between 1990 and 1995, from 2100MW to 4200MW, equal to 23% of total capacity. Around 1997 some 27% of electricity was produced by decentralized generators, leading to overcapacity and inefficiency, hence, the structure imposed by the Act was self-destructive.

Not only was the situation unsustainable, the Dutch structure also was incompatible with the Electricity Directive; hence, European developments necessitated drafting a new law. The first articles of the new Electricity Act came into effect in 1998. That year, of the 103.8 TWh of electricity consumed in the Netherlands, 60% was centrally produced, 29% came from decentralized sources, while net imports amounted to 11%.<sup>2</sup> NMA (1998, 1999a) provides data on electricity supplied to the grid, that is, with self-production (12% of the total) excluded. NMA (1998) reports that in 1996 the share of central production in domestically produced electricity was 75%, with EPON having a market share of 25%, EPZ 19%, UNA 17% and EZH having 14%, and states that these shares are not very different in 1997. The following table, based on NMa (1999a) gives production for the grid in 1998.

Producer	Prod. (GWh)	%
EPON	19,314	24
EPZ	14,734	18
UNA	12,349	15
EZH	11,215	14
SEP	1,073	1
<i>Total central</i>	<i>58,685</i>	<i>73</i>
Distribution companies	5,185	6
Industry (surplus delivered to grid)	7,550	9
<i>Total decentralised</i>	<i>12,735</i>	<i>16</i>
Imports	12,840	16
Losses	-3,860	-5
<i>Net production</i>	<i>80,400</i>	<i>100</i>

**Table 1:** Production of electricity in the Netherlands in 1997; Source NMA (1999a)

In the following sections, we will see how the market has developed from this starting position.

<sup>2</sup> In 2003, these numbers were 58%, 27% and 15%, respectively.

### 3. THE ENERGY ACT 1998

The main goal of the Electricity Act 1998, which implemented the first Electricity Directive 96/92/EC, was to accomplish more competition on the market by allowing more consumer choice, while maintaining efficiency in generation and security of supply. While the Act dealt mainly with liberalization of the retail market and regulation of the network parts, it was introduced against the background of the four large generators planning to merge into a large-scale producer. Indeed, the minister encouraged such a merger to create a national champion that could be competitive at the European level. Consequently, the tension that was built into the 1989 Act was also present in this one. In the end, the producers could not agree and the merger would not take place. In this section, we describe the main outlines of the law, providing a preview of the contentious elements, leaving a more detailed discussion on the various market segments till the later sections of the paper.

In broad outlines, the E-Act 1998 follows the recipe for market restructuring as described in Joskow (2003 a, b) and in several aspects it went considerably further than required by the first Electricity Directive: the speed of liberalization was quicker, legal unbundling was required instead of accounting separation, and regulated third party access to the networks was insisted upon. Overall, the aim was to move to a more demand oriented system, with the retail market being gradually liberalized. The largest 350 users, those with an annual demand of at least 100 GWh, representing about one-third of demand, had freedom of supplier immediately; the middle segment (29% of demand) had such a choice as of January 2002, and the small users (38% of demand) as of July 2004. To make sure that choice was worthwhile, the sector-specific restrictions on generation, trade and imports of electricity were lifted. Specific licenses for large-scale production were no longer needed and all players were allowed to import. Distribution companies were no longer forced to pay generous feed-in tariffs for decentrally-produced electricity and the compulsory “pooling” of the large-scale producers was abolished. After the expiration of a transition period, needed to unwind the cooperative SEP agreement, the “protocol” that described the market sharing between the major players, all generators could compete for the liberalized market segment. In effect, generation became completely free of sector-specific regulation. Generation was considered to be a competitive activity and in line with the general Dutch policy framework on privatization at the time (see Van Damme (2004)), privatization of generation companies was allowed.

The 1998 E-Act and the Explanatory Memorandum to the Law mentioned the importance of technical dispatch and maintaining energy balance at all times, but it only specified that this was the responsibility of network operators, with there being a special role for the operator of the national grid. The Act did not discuss wholesale trade in electricity at all; this was considered to be the exclusive domain of the players on the market. In this respect, there is a difference with the recipe for restructuring from Joskow (2003 a, b). Joskow stresses the importance of setting up wholesale markets, including an imbalance market for real-time adjustment and of appropriate monitoring of the wholesale market, so as to ensure that market power will not be abused. In the Netherlands, only the competition law (almost a literal translation of the European Law) can be used to keep a check on market power. As we will see below, wholesale markets would develop, but they turned out not to be very liquid.

To separate the competitive segments in the sector from the monopolistic bottlenecks, the 1998 Act imposed legal unbundling of the networks, with network owners having to set up special, independent, organizational units responsible for network management. Ownership unbundling was not required, but, to guarantee true independence of network

management, the Act insisted that the resulting structures had to be approved by the minister. In this respect, the explanatory memorandum to the law put special emphasis on the high voltage grid being managed independently from the producers, and it would take considerable time before the minister was convinced that such independence had been achieved. The Act also stressed the importance of horizontal integration of the transmission networks to bring these under common management. While the general Dutch privatization framework stipulated that monopolies could be privatized, provided that effective regulation could be guaranteed, the E-Act 1998 imposed a moratorium on privatization of the network companies until competition had been developed sufficiently and until regulatory supervision had proved itself. In the period under consideration, there would be a heated discussion on privatization.

The E-Act 1998 also established, as of August 1, 1998, DTe, the independent regulator for the energy sector, as a chamber of the Dutch competition authority NMa. DTe was charged with supervising the sector and had the responsibility to guarantee non-discriminatory access to the grid for generators and to regulate the prices of the captive end users. The law forced energy companies to split their tariffs into network tariffs (including systems services) and tariffs for energy use as of the year 2000. DTe regulated the network tariffs and the final tariffs of the captive users, with the law imposing an RPI-X formula and the “1996=2000 principle” stating that overall prices in the year 2000 could not be higher than those that prevailed in 1996. We will return to regulation in section 6.

#### **4. GENERATION AND WHOLESALE MARKETS**

As seen above, in 1998, there were four large-scale licensed electricity generators: EPON, UNA, EPZ and EZH, who cooperated together in SEP and the E-Act was built on the assumption that these producers and SEP would merge together to create an efficient large-scale producer, GPB, which could compete in Europe. The minister and parliament were in favor of such a merger and to facilitate the merger process, the government had promised to pay a certain share of the stranded costs of production in case it would take place. In April 1998, immediately after the second chamber of parliament had approved the E-Act 1998, it turned out, however, that the four producers could not reach an agreement. The main conflict was about the price GPB would charge the distribution companies: the two “pure” generators (UNA and EZH) were in favor of a high price, but the two other producers were instructed by their owners, the distribution companies PNEM/MEGA, NUON and EDON to insist on a low one. In addition, there were conflicts about how to share the burden of the stranded assets, while there was also the serious threat that the Dutch Competition Authority, NMa, would not have approved the merger; see NMa (1998). In this section, we describe how the production sector has developed since then.

After the merger plans fell apart, the two “pure” generating companies would quickly be privatized. In the generation segment, the law did not impose any sector-specific restrictions on asset sales; if anything, privatization was encouraged, the only constraints being that buyers had to commit to honor the obligations with respect to stranded assets and not to exert any influence on the national grid company TenneT (see below). Based on the idea that the wholesale market would be competitive, the production sector was completely unregulated, hence, only the general competition and environmental laws apply. In March 1999, The American energy company Reliant announced its intention to buy UNA for approximately € 2 billion, and while the Minister of Economic Affairs was somewhat surprised by the speed of developments, she approved the takeover in September. In August, the German energy company E.On bought EZH for about € 1 billion, after a combination of



ENECO (a distribution company active in the West of the country) and Shell had failed to reach a cooperation agreement with EZH. Again, this cross-border merger was quickly approved.

In April 1999, PNEM/MEGA announced its intention to merge with the distribution company EDON. According to the NMa the merger would lead to a dominant position on the generation market, and in October, the merger was approved subject to the condition that EDON divest its 50% share in the producer EPON, the largest (4600 MW) and most modern producer in the Netherlands. Nuon, another distributor, owned the other 50% of the shares and as this company did not regard electricity production as a core activity at the time, EPON came on the market as well. In November, Electrabel (with its dominant position in neighboring Belgium) bought EPON for about € 2.7 billion. Consequently, one year after the new law came into effect, three out of four generators were in foreign hands, two of which were vertically integrated neighbours.

After the distribution companies PNEM/MEGA and EDON had merged, they changed their name to Essent, a name that we will use from now on. The intention was to merge further with the distribution company Delta, but that merger would not take place. Essent and Delta reshuffled their generation assets, with part of these coming directly under the influence of Essent and other part (the “new” EPZ) being 50% owned by each of these distribution companies. Note that, in 1999, Dutch energy companies followed different strategies: Essent, and the smaller Delta, developed into vertically integrated energy companies; Nuon was pursuing a strategy as a multi-utility distributor, Eneco was a pure energy distribution company; in addition, there were three pure generating companies.

Data available at [www.energie.nl](http://www.energie.nl) show that, in 1999, total installed capacity in the Netherlands was 20.4 GW of which 69% was centralized capacity in the hands of the large-scale producers. Of the 14.2 GW of central capacity, Electrabel had 4.7 GW (33%) of which 85% was gas fired, Reliant 3.7 GW (26%) of which 80% was gas fired, Essent 3.3 GW (23%) of which 60% was gas fired, E.On 1.7 GW (12%) of which 65% was coal fired, while EPZ had 0.85 GW (6%) this including a nuclear station of 450 MW. The 6-7 GW of distributed (or ‘decentral’) generation capacity, was mainly CHP, co-owned by distribution companies and industry. This situation would largely remain unchanged until 2003.

To assess the competitive situation on the wholesale market, it is important to be aware of the possibilities for import resulting from the Dutch network being interconnected with Belgium and Germany. Total available transfer capacity on the German-Netherlands interconnector is some 2200 MW, most of which is allocated through auction. Capacity on the Belgium-Netherlands interconnector is 1150 MW and again this is made available by means of auctioning. Incumbent generators are allowed to acquire at most 400 MW of import capacity and NMa (2003) reports that in 2002 the HHI on the Dutch market was 1754, hereby assuming that each incumbent layer has indeed acquired this maximum. As prices in Germany traditionally have been lower, it is attractive to import. In 2001, total consumption of electricity in the Netherlands was 107 TWh; domestic units produced 90 TWh, while net imports were 17 TWh. Most of these imports, over 16 TWh, were from Germany. Flows with Belgium were more balanced, with imports being 4.5 TWh and exports being 3.5 TWh.

#### **4.1 The Nuon- Reliant Merger and the VPP Remedies**

In 2003, after having been active on the generation market for less than 4 years, Reliant announced its intention to leave the Netherlands again and it reached an agreement that Nuon would buy the generation assets. At that time, Nuon already had changed its

strategy: it owned 900 MW of decentralized capacity, while it had also contracted the Interger unit (800 MW) that is scheduled to come on line in 2005. With the merged entity becoming the largest generator on the market, the HHI increasing to 1974 after the merger, and the merger creating a market structure with two large vertically integrated energy companies (Essent and Nuon), and wholesale markets not being very liquid (see below), the NMa was concerned that this was another step on the road to a tight oligopoly with perhaps only three, or at most four, integrated players. It, therefore, ruled that a license was required and decided that the merger could be approved only after divestiture of 900 MW of capacity, by means of a Virtual Power Plant (VPP) auction; see NMa (2003).

The competition authority argued that the merger would bring several flexible units under common management, this strengthening market power. The merger would eliminate the competitive constraint that Nuon imposed on the three large players (Electrabel, Essent, Reliant) as Nuon, instead of being a price follower, would become a strategic, price setting player as well. To investigate the effects of the merger, NMa commissioned two market simulation studies, one by Frontier Economics, the other by ECN, the Dutch energy study center. Frontier's analysis is based on the SPARK model, a Supply Function Equilibrium model. ECN's analysis is based on its Competes model, a Cournot model.

The SPARK model contains information about marginal costs and capacities of all generating units. It is assumed that, before the merger, (only) Essent, Electrabel and Reliant are strategic players, while after the merger this holds for Electrabel, Essent and Nuon. The German interconnector is added as a non-strategic player, while on the interconnector with Belgium various scenarios are calculated. Each strategic player is assumed to have 17 strategies which correspond to bidding a certain multiple of the assessed marginal cost, ranging from competitive bidding (multiple 1) to 15 times the marginal costs. On the demand side, a range of several levels (with steps of 200 MW) is distinguished. Each strategy of a strategic player translates into an individual supply function. Intersecting the resulting aggregate supply function with the given market demand yields the market price, with units that are bidding less than the market price receiving this price. For each level of demand, the model calculates the Nash equilibria and it is found that for many levels, there might be multiple equilibria. The Nash equilibria given rise to different prices, and one can calculate the maximum, minimum and median prices. As a point predictor, Frontier then uses the "median equilibrium" and the median price. Using the information about the empirical distribution of demand, then allows one to calculate a price duration curve. This price duration curve can then be compared with the price duration curve that will result after the merger. It is found that on average prices would increase by some 13% as a result of the merger.

The COMPETES model of ECN is a Cournot model that contains information about production units in the Benelux, Germany and France, as well as information about the electricity network in these countries. It is based on a linear demand curve, where 12 different demand curves are being distinguished: 3 different seasons (summer, winter and fall/spring) and for each of these super peak, peak, shoulder and off-peak periods. For each of these periods, one point on the demand curve is determined from historical data while at that point an elasticity of  $-0.2$  or  $-0.1$  is assumed, hence, there are two scenarios. Given information about marginal costs of different units, the above determines a well-defined (quantity constrained) Cournot game of which the Nash equilibria are computed. Again one can compare prices before and after the merger. For an elasticity  $\varepsilon = -0.2$ , the average price increase is 5.9%, while if the elasticity is  $-0.1$ , the average price increase is found to be 10.4%.

Not entirely unexpectedly, the merging parties do not agree with the above analysis and they pointed out several weak points and drawbacks of the simulation models: the pre-merger price distribution is not in line with that actually observed, inelastic demand is unrealistic, demand side bidding is neglected, the modeling of the interconnector is inappropriate, the specification of the strategy space is arbitrary and may influence the results, and the model assumes complete information. NMa, however, argued that the results remain largely intact if different, more realistic assumptions were made, hence, that the conclusions are robust. On the basis of this analysis, NMa concluded that the merger would lead to a significant price increase, hence, could not be allowed.

To relieve the concerns of NMa, Nuon offered to divest 900 MW of firm capacity through a VPP-auction. NMa accepted a commitment in which the 900 MW would be offered in 90 blocks of 10 MW, each accompanied with an electricity price equal to the marginal cost of the Intergeren plant, for a period of 5 years, with re-evaluation after 5 years. NMa proposed that Electrabel, Nuon and Essent would not be allowed to participate in this auction. Under these conditions, the 900 MW would be competitively offered to the market, and as a simulation by Frontier showed, this would indeed do away with the concerns. Although Nuon at first accepted these conditions, it later appealed this decision of NMa, as did Essent. Nuon argued that the requirement that on the duration of the contract, 5 years, was excessive and that this would result in too low an auction price. Essent objected to being excluded from the auction. In an interim judgment, the court ruled that in the first auction only capacity for one year had to be offered and that Essent was allowed to participate. Meanwhile, Nuon and Eneco reached agreement that the Intergeren contract (800 MW) would be transferred to Eneco, which lead Nuon to request to be forced to auction only 200 MW. The NMa agreed and in September 2004, 200 MW with a contract length of one year was auctioned. In August 2004, Nuon requested NMa not to have to sell additional capacity as of 2006, the argument being that additional favorable changes in market conditions had taken place, such as new plants coming on line and the construction of an interconnector with Norway being likely to take place. NMa asked Frontier to do an additional analysis and concluded the price effect would now be only around 1%, even without the NorNed cable. As a result, NMa lifted the restrictions on Nuon, provided that the divestiture to Eneco would indeed take place; see NMa (2005).

## **4.2 Markets and Liquidity**

In January 1997, the large-scale producers and the distributors signed a “protocol”, a set of contracts, freezing the market till the end of 2000. The protocol fixed prices and quantities and stated that producers would not engage in new supply contracts during the period. Article 76 of the E-Act 1998 committed the players to abide by the protocol, the idea being that this would allow for an orderly transition period in which various market places to facilitate competition could be set up. Since January 2001, full-blown wholesale competition has been possible.

Electricity is traded on several wholesale markets. In addition to the informal, bilateral market for non-standardized contracts, there are several markets for standardized products, which help in making the market transparent. The APX, which was founded by energy companies and financial institutions, (see [www.apx.nl](http://www.apx.nl)) has offered a day-ahead spot market since the summer of 1999. The APX uses a single price two-sided auction format on which one can trade today, in hourly contracts, for delivery of electricity tomorrow. Although it is a voluntary market, regulations force electricity imported using capacity bought in TenneT's

day-ahead interconnector auctions to be traded through the APX. Clearly, this contributes to the success of the APX: if all day capacity were used for imports, the amount traded on the APX would exceed the present levels. In the first year, the volume traded on the APX was about 2% of Dutch total net electricity consumption, in 2000 it was 6% in 2000 and it has increased to 15% (14.12 TWh) in the record year 2002. (As we will see below, that year was exceptional as a consequence of attractive subsidies for green energy in the Netherlands.) In 2003, the traded volume was 12 TWh and in 2004 the volume was 13.4 TWh. The APX publishes volume and price indices, as well as post market aggregated demand and supply curves, thereby contributing substantially to increased transparency.

In May 2001 TenneT, the operator of the national grid, acquired the APX. In turn, as we will discuss in more detail in the next section, TenneT was fully acquired by the Dutch state in October 2001. (The state had always been the majority shareholder in TenneT.) TenneT also operates the balancing market for regulating power that is used for short-term adjustment; see TenneT (2001). Program Responsible Parties (PRP's) have to notify their E-programs a day-ahead, but they are allowed and encouraged to adjust their E-programs until 1 hour before actual delivery. On the balancing market, the parties bid to give TenneT the right to adjust their imbalance, using a single-price auction format. The volume of electricity that is traded on the imbalance market is about 3.5% of consumption; see DTe (2004a). A subsidiary of TenneT is responsible for organizing the auctions by means of which the import capacity at the borders with Belgium and Germany is allocated; see [www.tso-auction.org](http://www.tso-auction.org).

On the OTC-market, standardized contracts of various lengths are being traded. In 2003, the market platform Endex came into existence. Daily, Endex publishes prices for a variety of standardized OTC-products. In 2003, 9 TWh of electricity was traded on Endex. Users of Endex are the major producers and distributors and a couple of smaller players. A second trading platform is Energiekeuze in which 2.3 TWh of electricity was traded in 2003. Energiekeuze started its operations in 2001.

In two reports (Newbery at al. (2003) and DTe (2004a)), the Dutch regulator has expressed concerns about the limited liquidity on Dutch wholesale markets: the number of active players is decreasing, the traded volume has not increased since 2002, and there is a strong price reaction to an additional order of a certain amount of MW. The reports also link liquidity to the structure of markets and to market power of the incumbent generators. Earlier, in an investigation of price peaks on the APX in the summer of 2001, the Market Surveillance Committee had drawn attention to the possibility of exerting market power in times of scarcity; see DTe (2002a). In retrospect, the possibilities for exerting market power on the wholesale market might have been underestimated at the time the law was drafted, and there might have been insufficient awareness of the potential pitfalls involved. After the California crisis, it has been discussed whether, to guarantee the public interest, some type of licensing of generation would not be desirable, but at the moment, the wholesale market is still completely unregulated.

## **5. TENNET, THE TRANSPORT GRID AND INTERCONNECTION**

The requirements of non-discrimination and accounting separation imposed by Directive 96/92/EC were implemented by insisting on legal unbundling between production, network services and supply, as well as by certain other procedural safeguards. The 1998 Act forced the economic owners of the networks to set up independent network companies, with the appointment to be approved by the Minister. Consequently, the 1998 Dutch Electricity Act went already much further than the First Directive demanded; in fact, most of the

requirements of the second Electricity Directive (2003/54/EC), to be implemented by July 2004, were already met by that Act.

On August 1, 1998, the same day on which the first articles of that Act became operational, SEP, the owner of the national grid, established TenneT as independent operator for that grid. Initially, the Dutch State acquired 50% of the shares plus 1, in return for its contribution to recover the costs of the stranded assets in the production sector. The appointment of TenneT as manager of the national grid had to be approved by the Minister, who had to guarantee that TenneT could operate independently from the production companies. In this respect, there were points of concern. In April, one of the large users of electricity, Hydro Agri, had issued a complaint with the NMa that SEP was abusing its dominant position on the market by refusing it the right to import, and indeed the NMa would conclude that there was an abuse; see NMa (1999b). Secondly, in what is probably best seen as an attempt to block network investments that could be used to expand imports, hence, increasing competition, SEP at first refused to delegate important investment decisions to TenneT. As a result, it took until 2000 before the Minister could approve the appointment of TenneT. When dealing with this issue, the question came up whether government ownership would be necessary to ensure non-discriminatory access to the transmission grid. The original idea was that it would be sufficient for the State to temporarily acquire the majority of the shares and that, after a transition period, full privatization could take place. However, during the summer of 1999, the Christian Democratic Party changed its position on the privatization issue to conclude that all essential grids, hence, also the national transport grid, should be owned by the State. Over time, other parties, with the exception of the Liberal Party, also came to adopt this position. In October 2001, this led to the State fully acquiring TenneT for a price slightly over € 1 billion. In November 2002, parliament decided to keep TenneT in public hands.

As SEP only owned the grids of 220 kV and 380 kV, not all grids with a transport function came under the management of the TSO. Consequently, TenneT has since then tried to acquire the other nets as well, which are currently owned by the distribution companies. In 2002, it announced its intention to bid on the distribution company REMU, but it was blocked by the Ministry of Finance, as this was considered too risky. REMU would then be acquired by Eneco; see section 6. In 2003, however, TenneT acquired TZN, the owner of a lower voltage grid that also has a transport function. In December 2004, TenneT published a document arguing that all grids at level 50 kV and above serve as transport grids, that it is inefficient that these grids are owned by different companies and that it would be desirable to bring these all under the management of TenneT; see TenneT (2004).

TenneT has also been expanding in other domains. In May 2001, TenneT bought the APX. In turn, in 2003, the APX bought APX (UK), a UK spot market for electricity. In June 2004, TenneT bought EnergieKeuze, the auction platform on which long-term energy contracts are traded (2.3 TWh in 2003). While it does make sense for TenneT to operate the APX (to ensure coordination between markets), it is less clear or what is the driving force behind the other acquisitions, in particular the foreign expansion. DTe has powers to regulate TenneT and in 2003 it published a consultation document on how this should be done during the second regulation period 2004-2007; see DTe (2003).

As stated in the previous section, a subsidiary of TenneT, TSO-auction, is responsible for allocating the interconnector capacity at the borders with Belgium and Germany. Data and regulations of these auctions are available at [www.tso-auction.org](http://www.tso-auction.org) and the reader is referred to that web site for further details. Section 31(6) of the E-Act 1998 allows TenneT to use the proceeds of the interconnector auctions to eliminate capacity restrictions, subject to approval

by the DTe. In August 2004, TenneT together with the Norwegian grid manager, Statnett, requested permission to construct a 600 MW, 580 km long, cable between the two grids. The cable would cost around € 600 million and would connect the hydro-based Norwegian market to the thermal based Dutch system.

In evaluating this proposal, DTe performed a social cost-benefit analysis. On the positive side, DTe notes that constructing the line fits into the European policy to construct trans-European networks, that it may have a positive influence on security of supply and also on market liquidity. Unfortunately, these positive effects of market coupling are not so easy to quantify. The trade benefits are easier to quantify and the calculations show that the net present value of the cable is around € 85 million negative so that the line would not be realized as a merchant investment project. Nevertheless, DTe decided to grant approval to the project, subject to certain conditions. First, transmission capacity on the cable should be allocated by means of market coupling of NordPool and APX to reduce transactions costs. Second, the capacity of the cable should be expanded to 700 MW. Third, TenneT should enter into certain commitments relating to cost minimization and availability of the cable. TenneT was willing to enter into these commitments and the contract with Statnett was signed at the end of 2004. As a result, the Dutch and the Norwegian market will be interconnected before the end of 2007.

Meanwhile, several other projects for further market integration are being investigated. Specifically, this concerns construction of a cable connection to the UK and market coupling with Belgium, Germany and France. In each case, the idea is that there could be benefits from increased market liquidity and reduced market power. On the other hand, market coupling with Belgium could lead to strengthening of the market power of Elektrabel. We refer the reader to Neuhoﬀ (2003) and Gibbs and Rijkers (2005) for further details.

## **6. DISTRIBUTION**

In this section, we discuss three issues related to distribution: unbundling, privatization and regulation.

### **6.1 Privatization and unbundling**

Article 93 of the 1998 Electricity Law states that privatization of distribution companies is possible, subject to Ministerial approval. Since 1999, there has been a heated political debate on the conditions under which privatization could take place, while at the same time a couple of smaller distribution companies have been sold to German utilities. Each time this happened, the responsible Minister (Jorritsma, Liberals) applauded the developments, but parliament objected, tried to block the sale and, failing to do so, forced the Minister to impose stricter rules on privatization. As a result, under the Kok II government a draft Act on “Privatization of Energy Distribution Companies” (Kamerstukken, 2001-2002) was drawn up. It proposed that privatization was allowed, provided it was guaranteed that the network manager could and would operate in a way “sufficiently independent” from the rest of the company. The Act was very complex, however, partly caused by the fact that it made a distinction between economic and legal ownership, and did not meet with any enthusiasm. When in 2002, before the privatization law could be discussed, another distribution company was bought by RWE, parliament was so upset with the fact that it could not block this privatization that it forced the Minister to withdraw the draft. After the 2002 elections, the new Minister indeed withdrew it, announcing at the same time that he would not allow any

further privatizations until the market would be fully liberalized. Since that time, the deadline has been shifted further into the future.

The current owners of the companies (local municipalities and provinces) are in favor of privatization: they argue that government regulation is sufficient to guard the public interests involved, that they, as a consequence of the Dutch legal regime, have no real powers to influence the decisions of the distribution companies in any case and that they have good use for the money that privatization would bring. Those against privatization have argued that there are several risks involved in privatization and that regulation might not be sufficiently powerful to adequately deal with these. The main concern is that an integrated (private) company would have an incentive to discriminate against competing supply companies, hence, that it would frustrate supply competition. Other concerns are that the revenues from the network business could be used to cross-subsidize its supply business (again leading to “unfair competition”), and that an integrated company might under-invest in the network, with the State not having powerful legal means to intervene in case of mismanagement.

The debate here is about the choice between structural regulation versus behavioral regulation; see OECD (2003). Recall that the 1998 E-Act already insists on legal unbundling between distribution and supply, a requirement that, at the EU level, was imposed only by the second Electricity Directive (2003/54/EC). When the E-Act was revised in 2004 to implement this second Directive, additional safeguards were put in place to ensure that the network manager could indeed invest and operate in a way “sufficiently independent” from the rest of the company. Among others, this Act insists that the network company should be the owner of the grid. Secondly, as the Act also strengthens the investigation powers of the regulator, it would seem that behavioral measures could be sufficient to address the potential problems.

In March 2004, the Minister of Economic Affairs has, however, argued that the additional measures might not be going far enough, and that, to avoid “unfair” competition on the supply market and underinvestment in the distribution networks, full (ownership) unbundling of the networks is necessary; see Ministry of Economic Affairs (2004a), and the second letter on this topic, Ministry of Economic Affairs (2004b). Specifically, the current proposal entails full (ownership) unbundling of the distribution network from supply and generation, with line of business restrictions being strictly imposed as of 2007. It is thus proposed to fully separate the competitive parts of the value chain from the monopolistic elements. The minister sees the following advantages associated with ownership unbundling at the distribution level:

- (i) It would create a level playing field at the retail market as vertically integrated companies would no longer have an incentive to raise their rivals’ costs and would also no longer have advantages associated with a lower cost of capital;
- (ii) It would make monitoring and regulation of the distribution companies easier, it would eliminate possibilities of cross subsidization and it would make it easier to prevent risky investments of distribution companies, thus giving them better incentives to invest in network quality;
- (iii) It would make possible immediate privatization of the unbundled supply companies.

In relation to the latter, the Minister argues that full structural separation does not destroy any value, hence, that current owners should be happy as well. In effect, he argues that this plan offers the best of all worlds: generation and supply can remain together, allowing companies economies of scale and scope, while separation will effectively deal with the anti-competitive concerns.

The vast majority of parliament supports the plans of the Minister, but current owners have not yet been convinced and the distribution companies are fighting the proposals.



Interestingly, while in other domains, cost-benefit analyses and quantitative assessments have played a major role, such inquiries are notably absent in this proposal. Equally interesting is the major change in policy: while five years ago privatization of the integrated distribution companies was considered to be unproblematic, it is now judged to be impossible.

## 6.2 Price-cap regulation

Until 1999, captive consumers paid a price for electricity in which tariffs for network services and supply were integrated. The prices had to be approved by the Minister of Economic Affairs, who allowed the cost increases to be passed on. The E-Act 1998 imposed that, as of 2000, distribution companies had to charge separate tariffs for transport services and supply, and that these had to be approved by DTe. For the first year, the Act specified the “1996 = 2000” principle, which entails that tariffs should be split in such a way that, when adjusted for volume changes, the 2000 revenues are not higher than those from 1996. Similarly, asset valuation should be based on the situation that prevailed in 1996. Secondly, the Act insisted on price cap regulation as of 2001. In fact, in article 27a, the Act specifies the following formula for the upper bound of the price of network services in year  $t$

$$(6.1) \quad p_t = \left( 1 + \frac{cpi - x_t}{100} \right) p_{t-1}$$

with a similar formula being specified, in article 41, for the electricity price for captive consumers. Here  $cpi$  denotes the consumer price index, while  $x_t$  is an efficiency component that, according to the Act, would be fixed by DTe for a regulatory period of 3 to 5 years. Unfortunately, the precision of the Act was in conflict with the intentions of the Act as described in the accompanying explanatory memorandum. In this section, which largely builds on Nilissen and Politt (2004), we describe the difficulties that this would lead to.

DTe had the authority, subject to certain guidelines in the law, to fix the aggregation level to which (6.1) would be applied as well as to determine the efficiency component  $x_t$ . As distribution companies differed in their productivity, implementing a uniform  $X$ -factor for all companies would obviously penalize firms that were already relatively efficient, while it would reward inefficient firms as the latter would find it relatively easy to find productivity improvements. The idea was to use the first regulatory period (2001-2003) to bring these companies to the same efficiency level, thereby creating a level playing field that would allow benchmarking between the companies as of the second regulatory period. Consequently, inefficient companies should be confronted with a higher  $X$ . In the consultation document on this matter, DTe (1999) proposed to regulate prices at an aggregate level. In effect, rather than regulating individual tariff elements, DTe opted for the regulation of (adjusted) revenue of the companies, i.e. the tariff elements were weighted with the quantities that prevailed in 1998/1999. Concerning the  $X$ -factors, DTe proposed to determine both the  $X$ -factor,  $X_e$ , that would be relevant for an efficient company and to set the  $X$ -factor for a company with a relative inefficiency  $S$  in 2001 equal to an individual  $X$ -factor  $X_i = X_e + S/T$ , with  $T$  the length of the regulatory period, thus ensuring that all companies would have similar levels of efficiency at the end of that period. It also proposed to determine the parameters by a variety of methods, of which DEA (data envelopment analysis) and SFE (stochastic frontier evaluation) were mentioned in particular.



When in September 2000, DTe published the first X-factors, it was clear that these were based only on the DEA methodology. The X-factors differed considerably between the distribution companies, and they were quite high for several of them, leading most of the companies to appeal the DTe decision, objecting to both the individual X-factors, as well as to the overall methodology employed. To deal with the objections, DTe was forced to revise the efficiency factors; this led to a new decision of DTe that again was appealed, etc. In Table 2, the first four columns provide the various X-factors that were relevant for the largest distribution companies, which overall are responsible for more than 90% of all connections to the grid; Essent and Nuon each have about 33% and Eneco has around 25%. The first three columns in Table 3 give the associated revenue reductions over the first regulatory period, as compared to the year 2000.

	X2000	X2001	X2002	X2003	X04-06
Eneco	8.1	7.0	4.4	3.2	2.7
Essent	0.6	0.6	4.7	0.6	3.8
Nuon	7.7	7.2	6.8	3.2	1.3
Average	5.1	4.4	5.1	2.0	2.6

**Table 2:** X-factors (%) (Source: Nillesen and Pollitt (2004))

	X2000	X2001	X2002	X2003	X04-06
Eneco	205	146	74	83	77
Essent	26	26	147	26	166
Nuon	270	217	168	114	51
Total	511	376	384	209	294

**Table 3:** Associated reduction in revenue (€ million) (Source: Nillesen and Pollitt (2004))

The reader may note that the efficiency factors for different firms are quite different and that the X-factors of various decisions may be quite different from each other. We may note that, if we abstract away from legal costs, it was a dominant strategy for firms to appeal as DTe applied the principle of “no reformatio in peius” which holds that appealing can never lead to a higher X. Consequently, a company could benefit considerably from “mistakes” of the regulator. Eventually, the conflicts reached the highest court for business affairs in the Netherlands, the CBB, and this ruled that the law did not allow the X-factors to differ between the different distribution companies, as the law stated:

“ $x_i$  is the discount factor to stimulate the efficient operation by grid companies”

Clearly, this was in conflict with the intentions of the Act and represented bad drafting. While to an economist, the Explanatory Memorandum to the Act is quite clear and unambiguously in favor of unambiguous X-factors, the court ruled differently and argued that the law had to be interpreted such that the same X-factor applied to all companies. Consequently, in October 2002, the CBB annulled the decisions of the DTe for the first regulatory period. DTe was, hence, forced to implement uniform X-factors and in 2003 it agreed with the distribution companies on an X-factor of 3.2.<sup>3</sup> As a result, the reductions in consumer prices that DTe promised have not been realized. While initially, DTe promised consumer saving of € 511 million over the first regulatory period (some 25% of the total revenue), the final result were savings of € 209 million.

<sup>3</sup> Essent profited from the “no reformatio” principle and had the lower X-factor of 0.6 % implemented.

Meanwhile, the Act has been clarified and redrafted; it is now clear that different firms can have different  $X$ -factors. Furthermore, it has been decided to use the second regulation period (2004-2006) to achieve convergence. During the second regulatory period use is made of benchmarking. As before, inefficient companies are required to catch-up. Secondly,  $X_e$  is determined as the average of the realized efficiency improvements of the efficient companies. Thirdly, while in the first regulation period, there was regulation only on price, in the second period (2004-2006), network quality will be regulated as well. The final column of Table 2 specifies the  $X$ -factors that apply during this second period. Taking into account that there are some 7.3 million costumers in the Netherlands and that the three large distribution companies have 90% market share, it follows from Table 3 that households save some € 13 per year as a result of the price-cap regulation of DTe.

## 7. MARKET LIBERALISATION

The demand side of the market has been liberalized in four steps, at a quicker pace than the Second Electricity Directive (2003/54/EC) requires. Large users, representing about one-third of demand, were free to choose supplier as of 1998. On January 1, 2002, the middle third segment of the market, consumers with annual demand at least 1 GWh, was liberalized. In response, some 20 new supply companies entered the market, including companies that were already well established, such as EnBW and Vattenfall, new start-ups, such as EnergyXS, and companies that before had only been active on the gas market, such as Cogas. In August 2003, the newcomer EnergyXS, which had acquired relatively many costumers, went bankrupt, and this showed that emergency supply for cases like this had not been adequately arranged. The network companies responded to the event by switching the former clients of EnergyXS to their sister supply companies, and this upset the Minister very much. He concluded that the Chinese walls between distribution and supply were not working and, in a letter to a newspaper, he threatened to impose legal unbundling on the vertically integrated companies. As we have seen in the previous section, the Minister has indeed pursued that plan.

Immediately after market opening in January 2002, some 30% of the middle segment signed new contracts, and the number of desired switches was so large that the system could not cope with it. In a survey reported on in July 2003, it was revealed that, in the 18 months since market opening, 60% of the non-captive power users had already switched supplier at least once, hence, the level of churn in this segment of the Dutch market is very high; see Datamonitor (2003). Switching seemed to be driven by extreme price sensitivity (with 75% of the volume being prepared to switch at a unit price savings of 2%), as well as by dissatisfaction with quality of service. Indeed, Datamonitor reports that the industry average of overall satisfaction in the Netherlands is only 88%, where comparable figures for France and Germany are 95% and 96%, respectively. The survey also revealed that large Dutch power users are especially dissatisfied with quality of service related to billing and account management, the rating here being as low as 62%.

In July 2001, the market for green electricity was opened for all consumers. As a result of the relatively generous subsidies, a large number of the small consumers have switched to green electricity. In July 2001, about 0.5 million consumers were buying green, one year later the number had doubled, and in July 2004, about one third of the consumers were buying green electricity. At the end of 2004, the number had increased to 2.8 million, or 40% of the households; see [www.energieprijsen.nl](http://www.energieprijsen.nl), where one also sees that there are many suppliers of energy, that the market is reasonably transparent and that there is considerable

price dispersion. The experience indicates that small users are not as price sensitive as those in the other market segments. EnergieNed (2004a) reports that of the 2.5 million households (36%) that had switched to green energy until the summer of 2004, only 18% had switched away from the incumbent supply company, either on the first switch (6%) or later (12%). Consequently, 3 years after market opening, a rather large percentage (82%) of the switchers have stayed with the incumbent company and 93.5% of Dutch households were still buying electricity from their local incumbent. As the incumbents were typically charging the same price for their green electricity as for their gray electricity, the vast majority of the households have not profited from the price savings that were available, hence, the green market experience suggests considerable incumbency advantages.

The entire residential market was opened in July 2004, half a year later than originally planned, this to avoid similar switching problems as the ones that had hampered the opening of the middle segment. Households could indicate their willingness to switch as of May 17 and in the 6 weeks leading up to market opening some 150.000 households (2%) requested to be switched. Clearly, this percentage is much smaller than the similar percentages observed in the market segment of larger users, and the companies could easily deal with it: their systems are able to handle 5% switchers per month. EnergieNed (2004b) reports that during the first two months 4% of households had made use of the possibility to switch and had chosen for another supplier. The number is small and it thus remains to be seen whether full retail competition will become a success. Of course, we should not expect too much. Just as in the UK, one should not expect retail competition to be very effective; see Waddams Price (2004).

## **7.1 Liberalization of the green market**

The Kyoto agreement, as translated by EU directive 2001/77/EG, implies for the Netherlands, a target of 9% of electricity consumption being green in 2010, with there being an intermediate target of 5% in 2007 and an ultimate goal of 17% in 2020. As seen above, green electricity is very popular in the Netherlands and, with 35% of Dutch households consuming green electricity around July 2004 and with 13% of consumption already being green in 2002, it seems that the Dutch should easily be able to meet the targets. This success has, however, been purchased at a high cost for the taxpayer, as we illustrate in this section, in a discussion that is mainly based on Van Damme and Zwart (2003).

The Dutch government has been pursuing green energy policies since 1996, when producers of renewable energy could first receive subsidies, in the order of magnitude of 20 €/MWh, for green energy consumed in the Netherlands. At first, the subsidies were available only for domestic producers, but, during 2000-2002 certain foreign producers could profit as well, provided that they did not receive other subsidies, had a contract with consumers in the Netherlands and could show that their energy was imported in the Netherlands. Small-scale (< 15 MW) hydropower was eligible for this subsidy, and apparently 2400 MW of such capacity stood ready to export to the Netherlands.

On January 1, 1996 the regressive ecotax (REB) on energy users was introduced. It was gradually increased over the years, for example amounting to 60 €/MWh for small consumers in 2002. In 1998, demand side subsidies were introduced: during the years 1998-2002 consumers did not have to pay the regulatory energy tax (REB) when they bought green electricity. More precisely, the supply companies did not have to pay this tax if they signed up a consumer of green electricity. Since 2003, these subsidies have been phased out again; in 2003 a consumer of green electricity had to pay 50% of the tax; in 2004, the tax break was 25%, and this subsidy is eliminated as of 2005. While initially, the demand side subsidies

could only be received for domestically generated electricity, as of January 1, 2002, they were also available for (certain types of) imported green electricity. Hydropower, for example, was excluded, but biomass was eligible for the subsidy. Interestingly enough, the change followed a lobby by the distribution companies, who argued that (potential) demand for green electricity outstripped domestic generation capacity, hence, that the resulting price increases would frustrate the green market.

The green market really took off when, in 1999, the subsidies were increased,. However, the system succumbed to its own success: the subsidies led to a strong demand response, making the system very costly. As a result, in 2003, the government changed the system. The essence of the new policy is to eliminate the demand side subsidies and to increase the supply side subsidies, but to limit these to newly or recently installed domestic production. Generators of green electricity located within the Netherlands will, for a period of 10 years, receive a subsidy related to the difference in cost of their technology and the cost of producing gray electricity, where technologies that are not much more costly will be compensated in full.

Recently, the General Accounting Office has calculated that over the period 1999-2004, the subsidies of the old system have cost the Dutch taxpayer € 1.56 billion, of which almost € 0.7 billion (44%) was in demand side subsidies. The most interesting year is 2002, when foreign generators could profit from both the supply and demand side subsidies. This year alone is responsible for one third of the amount: € 556 million in total, of which € 215 million in demand side subsidies. It is interesting to inquire who profited from these subsidies. We here provide a rough estimate.

First, we note that in 2002, 14 TWh of green electricity was consumed in the Netherlands, of which 10.5 TWh was imported and 3.5 TWh was produced domestically, which implies that € 280 million was involved in producer subsidies, a smaller amount than the one mentioned by the general accounting office; I am not able to explain the difference. Domestic producers can claim this subsidy (€ 70 million) in full; after all they do not need the cooperation of another party. In order to access these subsidies, green producers from abroad, however, have to pay increased prices for interconnector capacity. A rough estimate, based on the difference between the interconnector price in 2002 and that in later years, is that the interconnector price in 2002 was 10 €/MWh higher than it otherwise would have been. This implies increased auction revenues of € 105 million, which (by the rules governing the auction) is shared equally between TenneT and the auction organizers (RWE-Netz and Eon-Netz) on the German side. With total production subsidies for foreign production of € 210 million, this leaves € 105 million for the foreign producers, which we assume they can keep in full, hence, we assume that they do not have to share with Dutch supply companies.

The consumer subsidies (€ 215 million) have to be divided between consumers, producers and suppliers. As seen above, most consumers stayed with their incumbent supply company, hence, they benefited only a little, since, despite the huge subsidies, the incumbents' prices for green electricity were only slightly less than the prices they charged for gray electricity. For sure, some new entrants provided discounts on green energy in the order of 10 €/MWh to 40 €/MWh, but they only had a small market share. Recall that as of 2004 only 6% of consumers had switched to a different company, probably not all of them switched to a newcomer offering a better deal. If we assume that, in 2002, 3% of the households had switched to a cheaper supplier and saved 10 €/MWh in doing so, we see that consumer benefits were about € 10 million, a tiny fraction of the cost to the government.

In Van Damme and Zwart (2003) it is documented that the price for green certificates was rather small, between 10 €/MWh and 20 €/MWh, so that also producers benefited only

marginally from the subsidy. Consequently, the major beneficiaries of the scheme were the intermediary distribution companies: of the € 205 million that was left they received some 75%, or around € 150 million. Their lobby to make imports eligible for the REB-subsidies, which reduced the price of green certificates, was, hence, highly successful.

One may wonder why, given that subsidies were generous and green electricity consumers had a free choice of supply company, there was not more competition between these companies and why consumers did not benefit from lower prices. We have already seen above that consumers simply did not switch enough to newcomers, but why was there not more competition between the incumbents? Allegedly this is because the Ministry of Economic Affairs put pressure on these companies not to lower their prices for green energy; see *Financieel Dagblad* (2001). From a public finance perspective, this would be understandable, after all each household that switches to green electricity costs the Dutch taxpayer € 192 per year, but from a purely economic point of view, inducing cartel behavior to resolve a mistake in a policy design seems hardly satisfactory.

## 8. CONCLUSION

Ultimately, we would like to answer the question that Newbery and Pollit (1997) were able to answer for the UK: was it worth it? For several reasons, we are not yet able to do that. First of all, the Netherlands has started the liberalization process some 10 years later than the UK, time might still be too short. Secondly, there is no tradition of regulation in the Netherlands, hence, the counterfactual is hard to evaluate. Thirdly, there is not much public data in the Netherlands and there is no tradition of doing ex post policy evaluation. While many academic researchers in the Netherlands have complained about this in the past, surely the situation is improving now and with the development of markets more and more data are becoming available. It is hoped that we will be able to answer the bottom line question in the near future.

Even though the Netherlands was lagging the UK by about a decade, it seems that not always the lessons that could be drawn from the UK experience were incorporated in Dutch policy making. In England and Wales, one learned about the possibility to exert market power on the wholesale market and about the importance of having an adequate market structure and good regulatory oversight. In the Netherlands, the first idea was to combine a dominant player in generation with a competitive retail market, which seems to be inconsistent. After the idea of the “national champion” was given up, a competitive wholesale market was assumed to arise spontaneously and only the competition law was available as an instrument to check on market power. Apparently, there was great trust in market forces.

Similarly, it was claimed that retail market liberalization would bring great benefits. While freedom of choice is no doubt worthwhile for large users and for consumers in the middle segment, it is less clear that this holds for the residential market. Evidence from the UK indicates that freedom of choice of small users might be accompanied by more market power of the suppliers, not by less. Policy in this domain seemed to be guided by the standard economic textbook model and consumer inertia might not have been sufficiently taken into account. More generally, also in other contexts, Dutch policy seems to have been guided by the standard neo-classical model, with less attention for market failures than seems desirable.

We have seen that here, as in other domains (see *The Economist* (2002)) Dutch policy has largely been pragmatic. In many instances, economic models were used to base decisions on. The Nuon-Reliant merger, the NorNed interconnector and the setting of the X-factors are examples to illustrate this point. The latter example also illustrates that, perhaps, models

might have been taken too seriously, that is, without having sufficient eye for their limitations and drawbacks. Nilissen and Pollit (2004) argue that the way the X-factors have been set, and the conflict that resulted between DTe and the sector as a consequence of that, has done great damage to the energy sector.

At the same time, we have seen examples where policy did not seem to be guided by models at all, and this having costly consequences. An example is the stimulation policy for green energy, which was an interesting experiment, but which was very costly and did not lead to substantial investment in renewable energy sources. Perhaps a second example of this is the proposed unbundling of the distribution companies, where the discussion is guided more by political sentiment than by rational arguments. In this respect, it is interesting to observe that few countries have imposed ownership unbundling on distribution and supply and that one country that did impose such unbundling, New Zealand, is now rethinking that decision and is allowing network companies to be active in generation again.

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